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EXAMINER	
NATNAEL, PAULOS M	
ART UNIT	**PAPER NUMBER**
2614	

DATE MAILED: 04/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/981,794	KONDO ET AL.	
	Examiner	Art Unit	
	Paulos M. Natnael	2614	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *10-37* is/are allowed.

6)☒ Claim(s) *1 and 3-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Upon further consideration, the previously indicated allowability of claim 2 has been withdrawn due to new interpretation of the claims and the applied prior art. Examiner regrets the inconvenience this might cause the Applicant. However, this is necessary in order to conduct a thorough and complete examination of the claimed subject matter.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims **1, 3-6** are rejected under 35 U.S.C. 102(e) as being anticipated by Clatanoff et al. U.S. Patent No. **5,519,451**.

Considering claim **1**, a deinterlacing method for converting an interlaced image into a progressive image, comprising steps of:

a) performing a filtering process to pixels of at least one of three fields, is met by median filter **45**, fig.2;

b) a deinterlacing target field to be subjected to a deinterlacing process and forward and backward fields of the deinterlacing target field within the interlaced image, thereby generating an interpolation pixel for the deinterlacing target field, is met by the disclosure "a method for processing video data to produce a progressively scanned signal from an input of conventional interlaced video" (see Abstract) and that "The interpolated pixel X is determined using the motion signal k, in conjunction with the spatial neighbor pixels of X, as well as pixel Z from the previous field, in Fig. 3b." (col. 3, l23-25)

c) measuring a quantity of motion of the deinterlacing target field, is met by SVP 2 which generates the motion signal K at 28, fig.2;

d) changing characteristics of the filtering on the basis of the quantity of the motion, is met by SVP 1 fig.2, which uses the motion signal K to calculate the interpolated output at 36, Fig.2.

e) the claimed a filter which is used for the filtering process in the step of generating the interpolation pixel has characteristics of extracting vertical low frequency components of the deinterlacing target field, and extracting vertical high frequency components of the forward and backward fields of the deinterlacing target field, is met by spatial filters 29, comprising VLPF and HLPF, which are utilized to extract or pass low-frequency component and high-frequency component of the signal, respectively.

Considering claim **3**, the deinterlacing method of Claim 1 wherein in the step of generating the interpolation pixel, pixels in the deinterlacing target field or peripheral fields, which are in the same horizontal position as that of a position to be interpolated are subjected to the filtering process.

Regarding claim 3, see rejection of claim 1(a) and (b). (see also the discussion of fig.3b)

Considering claim **4,** the deinterlacing method of Claim 1 wherein in the step of measuring the quantity of the motion, the quantity of the motion is obtained from a difference between the deinterlacing target field or a frame including the deinterlacing target field, and other field or frame, is met by the difference calculated from the delayed field signal generated by delay 22 and the input signal Y, and output to the ABS 42 in SVP2, fig.2;

Considering claim **5,** see rejection of claim 4;

Considering claim **6**, see rejection of claim 4;

4. Claims **1, 3-8** are rejected under 35 U.S.C. 102(e) as being anticipated by Shin et al. U.S. Patent No. **6,630,961**.

Considering claim **1**, Shin discloses the following claimed subject matter, note;

a) performing a filtering process to pixels of at least one of three fields, is met by median filter **600**, fig.3;

b) a deinterlacing target field to be subjected to a deinterlacing process and forward and backward fields of the deinterlacing target field within the interlaced image, thereby generating an interpolation pixel for the deinterlacing target field, is met by the disclosure that the deinterlacing device includes "a field memory that stores m continuous field data containing an nth field data and positioned before and after the nth field data on the basis of the nth field data of a plurality of field data for output image" (Abstract, see also col. 7, lines 51-62)

c) measuring a quantity of motion of the deinterlacing target field, is met by the motion determination part **200** (fig.3) which calculates a motion value of the moving picture. (see col. 4, lines 48-52)

d) changing characteristics of the filtering on the basis of the quantity of the motion, is met by the vertical line converter **800** (fig.3), which "converts the number of vertical lines of the current field screen for generating the interpolated lines matched in the display, based upon the interpolated value outputted from the soft switch 500 and the field data values stored in the field memory 100." (col. 18, lines 61-67)

e) the claimed a filter which is used for the filtering process in the step of generating the interpolation pixel has characteristics of extracting vertical low frequency components of the deinterlacing target field, and extracting vertical high frequency components of the forward and backward fields of the deinterlacing target field, is met by median filter 600, spatial interpolator 300, and time interpolator 400, fig. 3; (see also col. 6, line 1-55)

Considering claim **3**, the deinterlacing method of Claim 1 wherein in the step of generating the interpolation pixel, pixels in the deinterlacing target field or peripheral fields, which are in the same horizontal position as that of a position to be interpolated are subjected to the filtering process.

Regarding claim 3, see rejection of claim 1(a) and (b).

Considering claim **4**, the deinterlacing method of Claim 1 wherein in the step of measuring the quantity of the motion, the quantity of the motion is obtained from a difference between the deinterlacing target field or a frame including the deinterlacing target field, and other field or frame, is met by the motion determiner 200, fig.3 which A detects the picture element values and brightness profile pattern difference values in specific lines existing among the field data stored in the field memory 100 to thereby calculated a motion value of a moving picture. [emphasis added] (see col. 4, lines 47-52)

Considering claim **5,** the deinterlacing method of Claim 1 wherein in the step of measuring the quantity of the motion, the quantity of the motion is obtained from a difference between the pixels which are used when the filtering process is performed in the step of generating the interpolation pixels.

Regarding claim **5**, see rejection of claim 4;

Considering claim **6**, the deinterlacing method of Claim 5 wherein in the step of measuring the quantity of the motion, the quantity of the motion is obtained from a difference between pixels which are included in the forward and backward fields of the deinterlacing target field, among the pixels which are used when the filtering process is performed in the step of generating the interpolation pixels.

Regarding claim **6**, see rejection of claim 4;

Considering claim **7,** the deinterlacing method of Claim 1 wherein in the step of changing characteristics of the filtering, the characteristics of the filtering are changed so that gain of components from the forward and backward fields of the deinterlacing target field is reduced as the quantity of the motion is increased, is met by vertical line converter 800, (fig.3) which "converts the number of vertical lines of the current field screen for generating the interpolated lines matched in the display, based upon the interpolated value outputted from the soft switch 500 and the field data values stored in the field memory 100." (col. 18, lines 61-67)

Considering claim **8**, the deinterlacing method of Claim 1 wherein in the step of changing characteristics of the filtering, the characteristics of the filtering are changed so that gain of components from the forward and backward fields of the deinterlacing target field is reduced to zero when the quantity of the motion is large.

See rejection of claim 7.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim **9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. U.S. Patent No. **6,630,961**.

Considering claim **9**, a deinterlacing apparatus for converting an interlaced image into a progressive image, comprising:

a) a filter unit for receiving a deinterlacing target field to be subjected to a deinterlacing process and one or both of forward and backward fields of the deinterlacing target field within the interlaced image, from the frame memory, and performing a filtering process to pixels of at least one of the received fields, thereby generating an interpolation pixel for the deinterlacing target field, is met by median filter **600**, fig.3;

c) a difference operation unit for measuring a quantity of motion of the deinterlacing target field, is met by the motion determination part **200** (fig.3) which calculates a motion value of the moving picture. (see col. 4, lines 48-52)

d) a filter coefficient setting unit for changing characteristics of the filter unit on the basis of the quantity of the motion measured by the difference operation unit, is implied because the reference of Shin et al. does change the characteristics of the filter unit (median filter 600) on the basis of the quantity of the motion measured by the motion determiner 200.

Except for;

a) a frame memory for storing the interlaced image;

Regarding a), Shin et al. disclose a field memory 100. However, it would have been obvious to the skilled in the art at the time the invention was made to modify the system of Shin et al. by providing a frame memory instead, so that the overall system is made less costly by storing images in frames rather than in fields, since a frame of video is formed with two fields.

Allowable Subject Matter

7. Claims **10-37** are allowable over the prior art.

8. The following is a statement of reasons for the indication of allowable subject matter: the prior art fails to disclose a deinterlacing apparatus for converting an interlaced image into a progressive image comprising: a frame memory for storing the

interlaced image, filter unit for receiving a deinterlacing target field to be subjected to a deinterlacing process and one or both of forward and backward fields of the deinterlacing target field within the interlaced image, from the frame memory, and performing a filtering process to pixels of at least one of the received fields, thereby generating an interpolation pixel for the interlacing target field, a difference operation unit for receiving the deinterlacing target field or a frame including the deinterlacing target field, and a field or frame which is adjacent to the deinterlacing target field or frame including the deinterlacing target field within the interlaced image, from the frame memory, and operating a difference therebetween, thereby measuring a quantity of motion of the deinterlacing target field; d) a filter coefficient setting unit for changing filter characteristics of the filter unit on the basis of the quantity of the motion measured by the difference operation unit; e) a double-speed converter for composing the interlaced image and the interpolation pixel generated by the filter unit, and generating the progressive image, as in claim **10**;

A deinterlacing method for performing a decoding process to a code sequence, field by field or frame by frame, which code sequence is obtained by coding an interlaced image composed of plural fields using motion compensation, and converting a decoded image of the interlaced image, obtained by the decoding process, into a progressive image, comprising: a decoding step of decoding the interlaced image, thereby obtaining the decoded image as well as obtaining a motion vector at the motion compensation which indicates a prescribed reference field for a target field; a motion vector conversion step of converting a motion vector for each of the fields, having a size

corresponding to a time interval between the target field and the prescribed reference field, into a motion vector of a size corresponding to a time interval of a fixed unit; an inter-field interpolation pixel generation step of obtaining pixels from reference fields which are forward and backward fields of a deinterlacing target field to be subjected to a deinterlacing process, on the basis of the motion vectors converted in the motion vector conversion step, and generating a first interpolation pixel for the deinterlacing target field; an intra-field interpolation pixel generation step of generating a second interpolation pixel using pixels in the deinterlacing target field; a weighting factor decision step of deciding a weighting factor which indicates a weighting ratio between the first interpolation pixel and the second interpolation pixel; and a progressive image generation step of obtaining a weighted mean of the first interpolation pixel and the second interpolation pixel using the weighting factor, thereby generating a third interpolation pixel, and interpolating the decoded image using the third interpolation pixel, to generate the progressive image, as in claim **11**;

A deinterlacing method for performing a decoding process to a code sequence, field by field or frame by frame, which code sequence is obtained by coding an interlaced image composed of plural f fields using motion compensation, and converting an decoded image of the interlaced image, obtained by the decoding process, into a progressive image, comprising: a decoding step of decoding the interlaced image, thereby obtaining the decoded image as well as obtaining a motion vector at the motion compensation which indicates a prescribed reference field for a target field; a motion vector conversion step of converting a motion vector for each of the fields having a size

corresponding to a time interval between the target field and the prescribed reference field, into a motion vector of a size corresponding to a time interval of a fixed unit;

a motion vector judgment step of judging effectiveness of the motion vectors converted in the motion vector conversion step; an inter-field interpolation pixel generation step of obtaining pixels from reference fields which are forward and backward fields of a deinterlacing target field to be subjected to a deinterlacing process, on the basis of the motion vectors converted in the motion vector conversion step and a result of the judgment in the motion vector judgment step, and generating a first interpolation pixel for the deinterlacing target field; an intra-field interpolation pixel generation step of generating a second interpolation pixel using pixels in the deinterlacing target field; a weighting factor decision step of deciding a weighting factor which indicates a weighing ratio between the first interpolation pixel and the second interpolation pixel; and a progressive image generation step of obtaining a weighted mean of the first interpolation pixel and the second interpolation pixel using the weighing factor, thereby generating a third interpolation pixel, and interpolating the decoded image using the third interpolation pixel, to generate the progressive image, as in claim **12**;

A deinterlacing method for generating an interpolation pixel for an interlaced image which is composed of plural fields, using pixels in each of the fields, and converting the interlaced image into a progressive image, comprising: an edge detection step of detecting a direction indicated by a line passing through a position to be interpolated where the interpolation pixel is generated and connecting peripheral pixels

of the position to be interpolated, as a direction of an edge; an edge reliability decision step of obtaining a strongness of a correlation between pixels existing in the direction of the edge, as a reliability of the edge; and an interpolation pixel generation step of generating the interpolation pixel using the pixels existing in the direction of the edge when the reliability of the edge is equal to or larger than a predetermined value, and generating the interpolation pixel using pixels existing in upper and lower directions of the position to be interpolated when the reliability of the edge is smaller than the predetermined value, as in claim **28**;

A deinterlacing apparatus for performing a decoding process to a code sequence obtained by coding an interlaced image which is composed of plural fields using motion compensation, field by field or frame by frame, and converting a decoded image of the interlaced image, obtained by the decoding process, into a progressive image, comprising: a decoder for decoding the interlaced image, thereby obtaining the decoded image as well as obtaining a motion vector at the motion compensation which indicates a prescribed reference field for a target field; an image memory for storing the decoded image; a parameter memory for storing the motion vector; a motion vector converter for converting a motion vector for each of the fields, having a size corresponding to a time interval between the target field and the prescribed reference field, which is read from the parameter memory, into a motion vector of a size corresponding to a time interval of a fixed unit;

an inter-field interpolation pixel generator for obtaining pixels from reference fields which are forward and backward fields of a deinterlacing target field to be

subjected to a deinterlacing process, on the basis of the motion vectors converted by the motion vector converter, and generating a first interpolation pixel for the deinterlacing target field; an intra-field interpolation pixel generator for generating a second interpolation pixel using pixels in the deinterlacing target field; a weighing factor decision unit for deciding a weighting factor which indicates a weighing ratio between the first interpolation pixel and the second interpolation pixel; and a progressive image generator for obtaining a weighted mean of the first interpolation pixel and the second interpolation pixel using the weighting factor, thereby generating a third interpolation pixel, and interpolating the decoded image read from the image memory using the third interpolation pixel, to generate the progressive image, as in claim **36**;

A deinterlacing apparatus for performing a decoding process to a code sequence obtained by coding an interlaced image which is composed of plural fields using motion compensation, field by field of frame by frame, and converting a decoded image of the interlaced image, obtained by the decoding process, into a progressive image, comprising: a decoder for decoding the interlaced image, thereby obtaining the decoded image as well as obtaining a motion vector at the motion compensation which indicates a prescribed reference field for a target field; an image memory for storing the decoded image; a parameter memory for storing the motion vector; a motion vector converter for converting a motion vector for each of the fields, having a size corresponding to a time interval between the target field and the prescribed reference field, which is read from the parameter memory, into a motion vector of a size corresponding to a time interval of a fixed unit; a motion vector judgement unit for judging effectiveness of the motion

vectors converted by the motion vector converter; an inter-field interpolation pixel generator for obtaining pixels from reference fields which are forward and backward fields of a deinterlacing target field to be subjected to a deinterlacing process, on the basis of the motion vectors converted by the motion vector converter and a result of the judgement by the motion vector judgement unit, and generating a first interpolation pixel for the deinterlacing target field; an intra-field interpolation pixel generator for reading pixels in the deinterlacing target field to generate a second interpolation pixel; a weighting factor decision unit for deciding a weighting factor which indicates a weighting ratio between the first interpolation pixel and the second interpolation pixel; and a progressive image generator for obtaining a weighted mean of the first interpolation pixel and the second interpolation pixel using the weighting factor, thereby generating a third interpolation pixel, and interpolating the decoded image read from the image memory using the third interpolation pixel, to generate the progressive image, as in claim **37**.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kawai et al. U.S. 5,534,935 discloses a processor for progressive scan generation of a television signals where a filtering system is utilized to extract the low and high frequency components of the input signal.

Kageyama et al. U.S. 5,216,505 disclose a scanning line interpolation circuit.

Ishizuka et al., U.S. 5,381,183 disclose motion-adaptive scanning-line conversion circuit

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paulos M. Natnael whose telephone number is (703) 305-0019. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Miller can be reached on (703) 305-4795. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PAULOS M. NATNAEL
PATENT EXAMINER

PMN
April 3, 2005